

The Effect of Central Bank Liquidity Injections on Bank Credit Supply

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Central Bank Liquidity and Bank Credit Supply

- ▶ Central banks recently provided extraordinary liquidity
 - Fed (TAF), ECB (LTRO), BoE (FLS)
 - Goal: restore bank credit supply following a negative shock
- ▶ Theory
 - Banks are fragile because of liquidity transformation
 - Banks hit by a negative shock reduce credit supply
 - Central bank liquidity restores bank credit supply
- ▶ Empirical evaluation is difficult
 - Recent episodes
 - Data limitation
 - Even with data, not obvious how to use

This Paper

- ▶ Tests the theory
 - ECB December 2011 liquidity provision
 - Official goal of “supporting bank lending”
- ▶ The intervention
 - The 3-Year Long Term Refinancing Operation
 - Provision of collateralized loans to banks
 - Largest liquidity provision in history (€1 trillion)
- ▶ Effect on Italian bank credit supply
 - Italian banks hit by a dry-up before the intervention
 - Unique experiment to dissect the transmission channel
 - Combine security- and loan-level data from Bank of Italy

Contribution

- 1) Central bank liquidity is effective in restoring bank credit supply following a wholesale funding dry-up
 - Banks hit by the dry-up :
 - (i) reduce credit supply during the dry-up
 - (ii) restore credit supply after the intervention
 - Firms benefit from the intervention

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- 2) Central bank liquidity encourages purchases of high-yield securities
 - Banks *not* hit by the dry-up use central bank liquidity to buy high-yield securities

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What's new? Transmission varies in the cross-section

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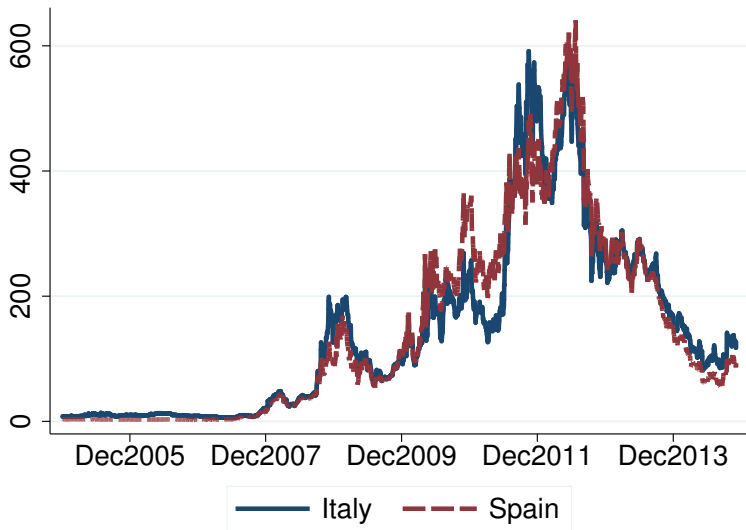
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SETTING AND DATA

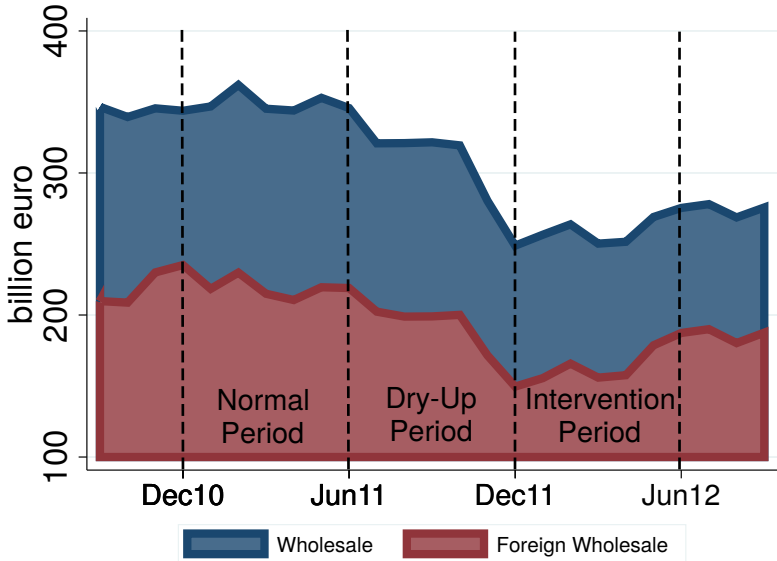
Rising Sovereign Credit Risk (CDS Spreads)



Dec 2011: ECB Lends €1 trillion to Eurozone Banks

- ▶ 3-Year Long Term Refinancing Operation (LTRO)
 - Largest LOLR intervention in history
 - Turning point of the crisis
 - Italian and Spanish banks largest users (2/3 total uptake)
- ▶ Simple design
 - 3-year maturity collateralized cash loans
 - Banks can choose how much to obtain in two allotments
 - Need to pledge collateral (government bonds, ABS,...)
- ▶ Italy as a laboratory

Italian Banks Hit by a Dry-Up



Data on the Entire Intermediation Chain

- ▶ Central Bank to banks
 - Bank-level borrowing at ECB
 - Bank-level borrowing at the 3-Year LTRO

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 - All outstanding loans \geq €30,000 (Credit Registry)
 - Term loans, credit lines, trade credit

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- ▶ Firms
 - Profitability and balance sheet characteristics
 - Large subset (55%) of firms

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EMPIRICAL STRATEGY

Two Empirical Challenges

- 1) Borrowers are not randomly assigned to banks
 - Stock of credit is an equilibrium quantity (demand, supply)

- 2) Negative funding shock is non-random and banks *choose* how much to borrow from the central bank

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Two Empirical Challenges

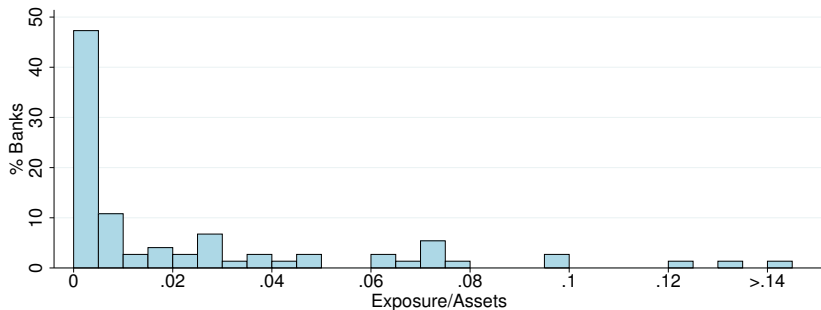
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 - ⇒ Regulatory experiment to capture the exposure to the *intervention*

Exposure to the Dry-Up

$$Exposure_j = \frac{ForeignWholesale_{j,Jun11}}{Assets_{j,Jun11}}$$

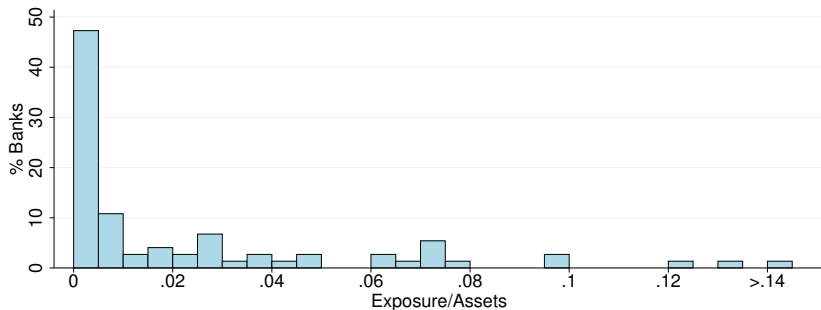
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75% of loans belong to banks with exposure > 5%

Summary Stats: Exposed and Non-Exposed Banks

	Unit	Exposed	Non-Exposed
Total Assets	billion €	11.0	1.3
Leverage	Units	13.2	10.8
Tier 1 Ratio	Units	9.1	11.4
Risk-Weighted Assets	% Assets	71.2	68.0
Nonperforming Loans	% Loans	8.6	8.7
Private Credit	% Assets	68.9	70.1
Securities	% Assets	14.2	14.0
Cash Reserves	% Assets	0.4	0.5
ROA	Profits/Assets	0.2	0.1
Central Bank Borrowing	% Assets	1.8	0.0
Household Deposits	% Assets	24.7	34.9
Wholesale Funding	% Assets	12.2	1.6
Bond Financing	% Assets	22.8	20.2

Exposed Banks are Large and Highly Levered

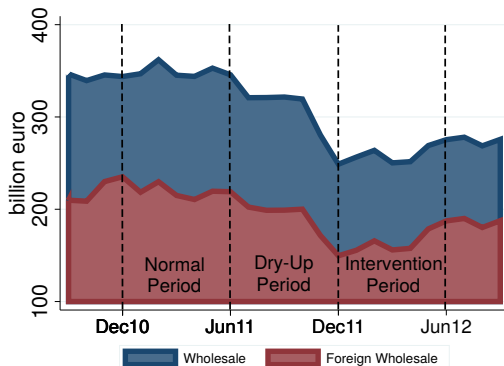
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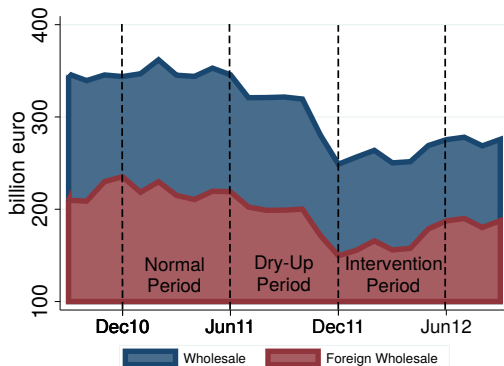
⇒ Need to control for bank characteristics

Three Time Intervals



- We identify 3 periods from the evolution of bank funding

Three Time Intervals



- We identify 3 periods from the evolution of bank funding
- Compare bank credit supply between
 - 1) the *normal* and the *dry-up* period
 - 2) the *dry-up* and the *intervention* period

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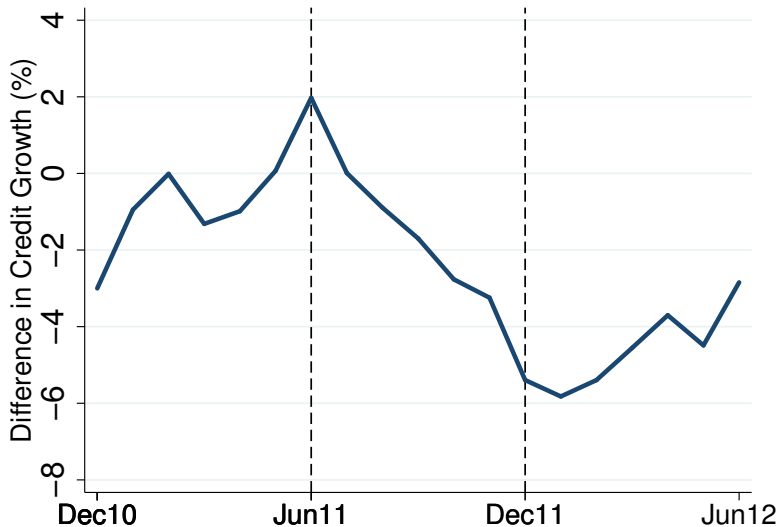
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MAIN RESULTS

Non-Parametric Evidence



Baseline Specification

$$\begin{aligned}\Delta \text{CreditGranted}_{ijt} &= \alpha + \beta_1 \text{Exposure}_j \times \mathbb{I}_{DU,LTRO} \\ &+ \beta_2 \text{Exposure}_j \times \mathbb{I}_{LTRO} \\ &+ \mu_{it} + \gamma_{ij} + \phi' X_{ijt} + \epsilon_{ijt}\end{aligned}$$

- Observations at the (i, j, t) firm-bank-period level

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- Four dates: Dec2010, Jun2011, Dec2011, Jun2012
- $\Delta\text{CreditGranted}$ is the change in credit granted
- Key RHS variable is *Exposure* interacted with:
 - $\mathbb{I}_{DU,LTRO}$ equal to one in the *intervention* and *dry-up* periods
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- Controls X_{ijt}

Evolution of Bank Credit Supply

$$\Delta \text{CreditGranted}_{ijt} = \alpha + \beta_1 \text{Exposure}_j \times \mathbb{I}_{DU,LTRO} + \beta_2 \text{Exposure}_j \times \mathbb{I}_{LTRO} + \mu_{it} + \gamma_{ij} + \phi' X_{ijt} + \epsilon_{ijt}$$

	ΔCreditGranted
$\text{Exposure}_j \times \mathbb{I}_{DU,LTRO}$	-0.127*** (0.045)
$\text{Exposure}_j \times \mathbb{I}_{LTRO}$	0.247*** (0.061)
Time FE	✓
Bank FE	✓
Firm-Time FE	
Relationship Controls	
Bank-Firm FE	
Bal. Sheet Controls	
N	2,322,142
R^2	0.005

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	$\Delta \text{CreditGranted}$	
$\text{Exposure}_j \times \mathbb{I}_{DU,LTRO}$	-0.127*** (0.045)	-0.129*** (0.037)
$\text{Exposure}_j \times \mathbb{I}_{LTRO}$	0.247*** (0.061)	0.251*** (0.044)
Time FE	✓	
Bank FE	✓	✓
Firm-Time FE		✓
Relationship Controls		
Bank-Firm FE		
Bal. Sheet Controls		
N	2,322,142	2,322,142
R^2	0.005	0.380

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	$\Delta \text{CreditGranted}$		
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$\text{Exposure}_j \times \mathbb{I}_{LTRO}$	0.247*** (0.061)	0.251*** (0.044)	0.245*** (0.043)
Time FE	✓		
Bank FE	✓	✓	✓
Firm-Time FE		✓	✓
Relationship Controls			✓
Bank-Firm FE			
Bal. Sheet Controls			
N	2,322,142	2,322,142	2,322,142
R^2	0.005	0.380	0.394

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	$\Delta \text{CreditGranted}$			
$\text{Exposure}_j \times \mathbb{I}_{DU,LTRO}$	-0.127*** (0.045)	-0.129*** (0.037)	-0.128*** (0.037)	-0.132*** (0.040)
$\text{Exposure}_j \times \mathbb{I}_{LTRO}$	0.247*** (0.061)	0.251*** (0.044)	0.245*** (0.043)	0.172*** (0.043)
Time FE	✓			
Bank FE	✓	✓	✓	
Firm-Time FE		✓	✓	✓
Relationship Controls			✓	✓
Bank-Firm FE				✓
Bal. Sheet Controls				
N	2,322,142	2,322,142	2,322,142	2,171,749
R^2	0.005	0.380	0.394	0.700

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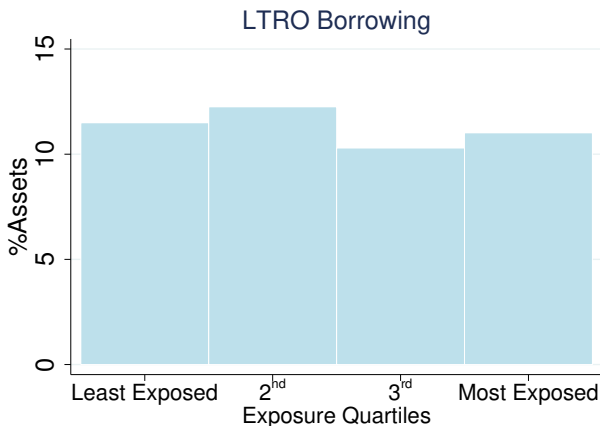
	$\Delta \text{CreditGranted}$				
$\text{Exposure}_j \times \mathbb{I}_{DU,LTRO}$	-0.127*** (0.045)	-0.129*** (0.037)	-0.128*** (0.037)	-0.132*** (0.040)	-0.114*** (0.031)
$\text{Exposure}_j \times \mathbb{I}_{LTRO}$	0.247*** (0.061)	0.251*** (0.044)	0.245*** (0.043)	0.172*** (0.043)	0.115** (0.053)
Time FE	✓				
Bank FE	✓	✓	✓		
Firm-Time FE		✓	✓	✓	✓
Relationship Controls			✓	✓	✓
Bank-Firm FE				✓	✓
Bal. Sheet Controls					✓
N	2,322,142	2,322,142	2,322,142	2,171,749	2,171,749
R^2	0.005	0.380	0.394	0.700	0.701

All Banks Take Advantage of ECB Liquidity

- ▶ The LTRO successfully attracts many banks
 - ECB liquidity is attractive compared to the private market
 - Median uptake is 10% of total assets

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Reconciling our Findings

- ▶ Need to reconcile two findings:
 - 1) Exposed banks restore their credit supply after the LTRO
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- ▶ Exploit regulatory intervention by the Italian government
 - Govt-guaranteed assets are eligible collateral at the ECB
 - Dec11: Govt offers a guarantee on securities for a fee
 - Banks can “manufacture” collateral

Reconciling our Findings

- ▶ Need to reconcile two findings:
 - 1) Exposed banks restore their credit supply after the LTRO
 - 2) *All* banks take advantage of the attractive ECB loans
- ▶ Exploit regulatory intervention by the Italian government
 - Govt-guaranteed assets are eligible collateral at the ECB
 - Dec11: Govt offers a guarantee on securities for a fee
 - Banks can “manufacture” collateral
- ▶ Large use of the government program
 - 28 banks create €102.8 bn collateral
 - Govt-guaranteed collateral backs 57% of total LTRO loans
 - Exposed banks are the largest users (1Q 68% Vs. 4Q 17%)

1) Transmission to Bank Private Credit

$$\Delta \text{CreditGranted}_{ijt} = \alpha + \beta \text{Uptake}_j \times \mathbb{I}_{LTRO} + \mu_{it} + \gamma_{ij} + \phi' X_{jt} + \epsilon_{ijt}$$

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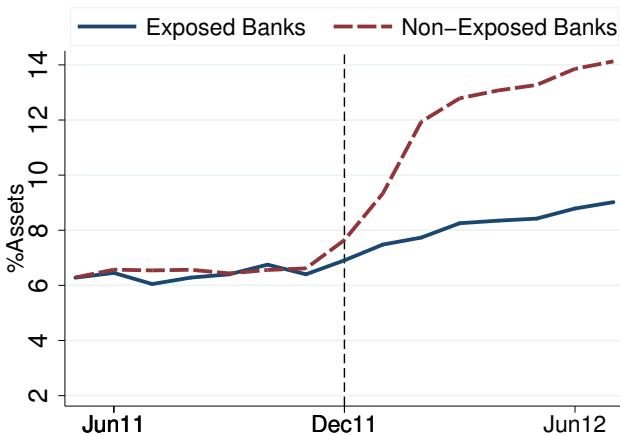
	$\Delta \text{CreditGranted}$		
$\text{Uptake}^{\text{Total}} \times \mathbb{I}_{LTRO}$	-0.042 (0.144)		
$\text{Uptake}^{\text{GovtGuarantee}} \times \mathbb{I}_{LTRO}$		0.249** (0.122)	
$\text{Uptake}^{\text{StandardCollateral}} \times \mathbb{I}_{LTRO}$			-0.269* (0.142)
Bank-Firm FE	✓	✓	✓
Firm-Time FE	✓	✓	✓
Bal. Sheet Controls	✓	✓	✓
N	1,381,420	1,381,420	1,381,420
R^2	0.655	0.655	0.655

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$$\Delta \text{CreditGranted}_{ijt} = \alpha + \beta \text{Uptake}_j \times \mathbb{I}_{LTRO} + \mu_{it} + \gamma_{ij} + \phi' X_{jt} + \epsilon_{ijt}$$

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Bal. Sheet Controls	✓	✓	✓
N	1,381,420	1,381,420	1,381,420
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2) Transmission to Holdings of Government Bonds



Magnitudes

- Of total €181.5 billion
 - €22.6 billion to firms
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 - €22.6 billion to firms
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- €1 to banks that *suffered* the dry-up:
€0.13 to firms and €0.44 in government bonds
- €1 to banks that *did not suffer* the dry-up:
€0 to firms and €0.83 in government bonds

Magnitudes

- Of total €181.5 billion
 - €22.6 billion to firms
 - €82.7 billion in government bonds
- €1 to banks that *suffered* the dry-up:
€0.13 to firms and €0.44 in government bonds
- €1 to banks that *did not suffer* the dry-up:
€0 to firms and €0.83 in government bonds
- Counterfactual exercise (Chodorow-Reich (2014)):
with no ECB bank credit –5.6% instead of observed –3.6%

Additional Results

- Which banks drive the dynamics of credit supply?
High-leverage banks (Kashyap and Stein (1995))
- Which firms banks reduce/restore credit to?
Risky firms (Jimenez et al. (2014))
- Are firms affected?
Yes, as they are unable to switch lenders

Final Thoughts

- ▶ “Central banks should require good quality collateral”
 - Banks hit by the run are collateral constrained
 - Italian government guarantee: fiscal side of the intervention

Trade-off: moral hazard Vs. restoration of bank credit

- ▶ Loan Maturity
 - ECB was providing short-term liquidity before Dec 2011
 - Banks were liquid, but facing large rollover risk

LOLR loan maturity matters for bank rollover risk